Understandings:

1. Explain ethology.
- This is the study of behaviour of animals in their natural habitat. Why natural habitat? Well, otherwise, they may behave differently and not show that "natural" behaviour.

2. Explain the link between natural selection and animal behaviour.
- Natural selection selects out the favourable genes. And genes may be a form of behaviour. An example is when birds migrate. Certain birds with a certain gene may migrate to a different place from the majority.

3. Explain the mechanism of natural selection.
- The mechanism of natural selection is the same for characteristics and behaviour. So when behaviour is inherited and hardwired in the brain, it can be selected.

For instance, the egg laying period is genetically inherited by birds (great tit). As climate changes, so will the available food, thus the some great tit birds may be laying egg in a favourable period. The key here is that there is a spread of birds that lays eggs in different periods, but with time, the ones laying at the optimal conditions will survive and reproduce. Therefore gene frequency will change.

4. Explain how learned behaviour can spread through a population or be lost from it more rapidly than innate behaviour.
- A change in innate behaviour means that the genes must be selected out. This takes time of course and is not something that can be achieved over night.

However, a learned behaviour can be spread quickly and also lost quickly. For instance, if a human discovers something new, like antibiotics, the knowledge spreads quickly. Conversely, if a learned behaviour is not taught to the next generation, then the next generation must re-learn the behaviour from scratch.

Application and skills:

1. Explain migratory behaviour in blackcaps as an example of the genetic basis of behaviour and its change by natural selection.
- Blackcaps migrate to a certain area due to its genes and not learned behaviour. If environment changes, the birds that migrate to another more optimal area will make it back alive and reproduce its genes.

2. Explain blood sharing in vampire bats as an example of the development of altruistic behaviour by natural selection.

- Altruistic behaviour is a behaviour that does not benefit oneself, and is simply done to be "kind". Vampire bats have this altruistic behaviour. The bats share their collected blood with other members in the group that failed to bring blood. In this case, it seems that evolution does not favour the fittest, but rather everybody (which is rare). Therefore, altruistic behaviour examples are seen as a flaw in evolution.

But evolutionary biologists argue that in this case, one bat cannot be seen as an individual, but rather a group of bats should be seen as an individual. Thus by sharing the food, the individual may favour in the future when that individual cannot collect blood. Overall, it keeps the population flourishing in number (which is increased chances of getting blood) and therefore increases chances to reproduce.

Extra notes

- A popular exam question is "explain/discuss altruistic behaviour of an animal, using a specific example". How should we best answer this question? I'll tell you. But note that depending on the points and the type of question, include different amount of information. An "explain" question will focus on the actual behaviour of the bats. A "discuss" question will focus on the pros and cons.

1. Define altruistic behaviour. It is a behaviour that is harmful for the individual but benefits the society.

2. Where can we see this? In vampire bats because they are a stable social group.

3. How is altruistic behaviour shown in vampire bats? Vampire bats share blood with those who failed to get it. This is altruistic because vampire bats starve if no blood is consumed for 48 hours. They even feed unrelated bats. Thus this sacrificial behaviour is called more specifically reciprocal altruism.

If this was a discuss question, then you should mention these.

1. It is against evolution and natural selection.

2. An explanation of why altruistic behaviour exists.

3. Explain foraging behaviour in shore crabs as an example of increasing chances of survival by optimal prey choice.

- Foraging = searching food.

It is about finding optimal food sources that can give you enough energy per time spent searching it. If energy expense is much greater than what you gain, there is no reason to search it!

For shore crabs, they tend to find for an intermediate sized mussels that has enough meat and relatively easy to open.

In the mussel's perspective, nature seems to select out the "extremes".

4. Explain the breeding strategies in Coho salmon populations as an example of behaviour affecting chances of survival and reproduction.
- Depending on the behaviour suited for its body, the Coho salmon can increase its chances of reproduction. Large salmons force pregnancy while smaller salmons sneak pregnancy.

5. Explain the courtship in birds of paradise as an example of mate selection.
- Some birds have extreme features to attract females, but these characteristics seem susceptible for easy detection by predators.

So why did nature favour these characteristics? Well, if the male birds with extreme features were able to survive with those traits, it must have other very advantageous genes suited for survival. Therefore, exaggerations may be an indication of health and fitness.

6. Explain synchronized oestrus in female lions in a pride as an example of innate behaviour that increases the chances of survival and reproduction of offspring.
- Oestrus is the period where females are sexually excited. For lions at least, females are unable to be in oestrus state while having cubs.

So when a new male challenges an existing dominant male and wins over him, the new male would kill all the cubs to make the lionesses fertile again. Then the new lion would pass on its genes. Since the new lion kills all cubs at the same time, it also makes the oestrus in all lionesses synchronized. This is advantageous in terms of lactation and in the future when leaving the pride.

7. Explain feeding on cream from milk bottles in blue tits as an example of the development and loss of learned behaviour.
- 100 year ago, people delivered un-homogenized milk, and blue tits could peck through the cap to drink the most nutrient rich top. This is a form of learned behaviour and other birds then imitated this behaviour very fast.

However, delivered milk is not very common today. Thus blue tits significantly have less success with this behaviour. Thus the behaviour is mostly forgotten.

TOK:

1. The "Just So" stories by Rudyard Kipling are literary explanations of animal behaviour. What are the features of a scientific explanation rather than a historical or literary explanation?